

FIG. 1

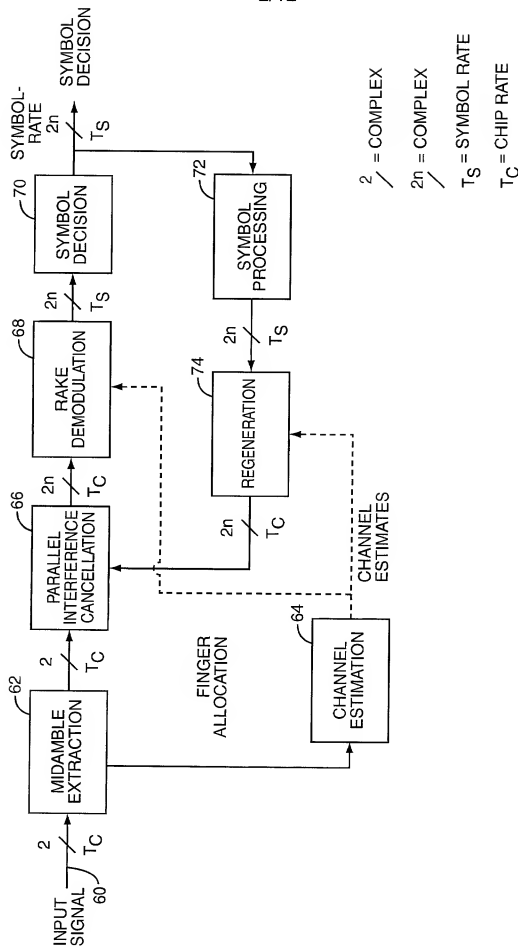


FIG. 2

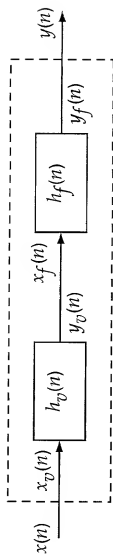


FIG. 3

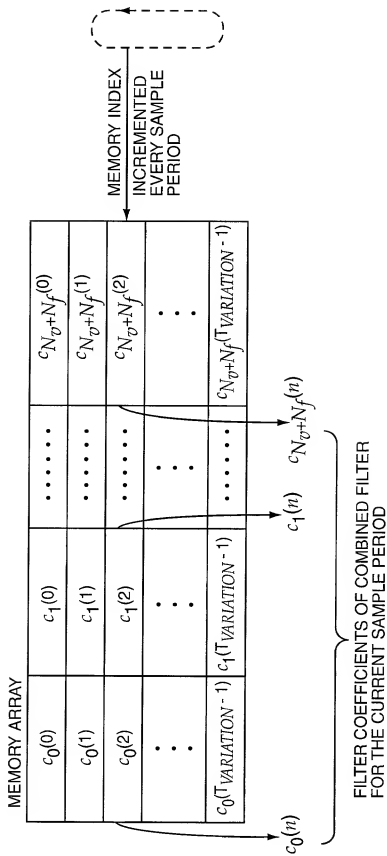


FIG. 4

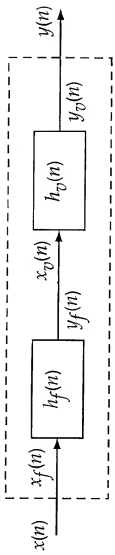


FIG. 5

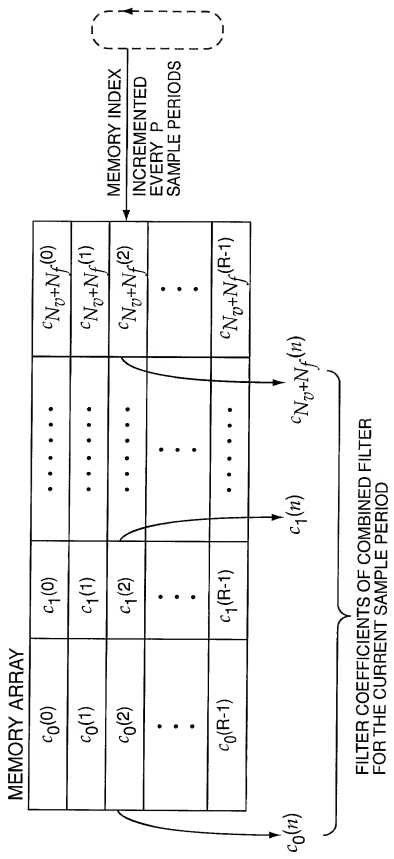


FIG. 6

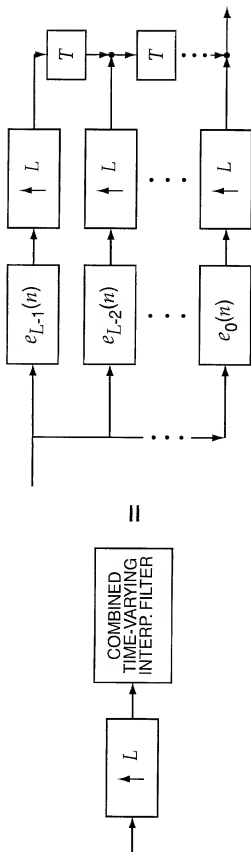


FIG. 7

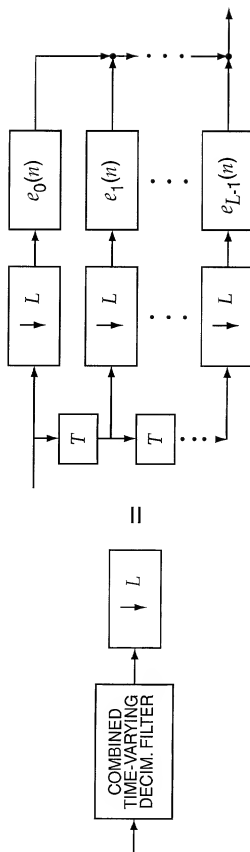


FIG. 8

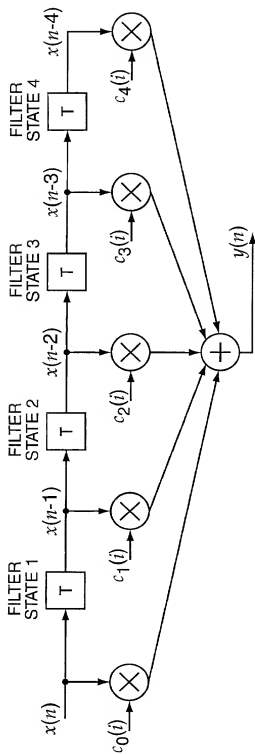


FIG. 9

MEMORY ARRAY

$c_0(0)$	$c_1(0)$	$c_2(0)$	$c_3(0)$	$c_4(0)$
$c_0(1)$	$c_1(1)$	$c_2(1)$	$c_3(1)$	$c_4(1)$
$c_0(2)$	$c_1(2)$	$c_2(2)$	$c_3(2)$	$c_4(2)$
$c_0(3)$	$c_1(3)$	$c_2(3)$	$c_3(3)$	$c_4(3)$
$c_0(4)$	$c_1(4)$	$c_2(4)$	$c_3(4)$	$c_4(4)$
$c_0(5)$	$c_1(5)$	$c_2(5)$	$c_3(5)$	$c_4(5)$

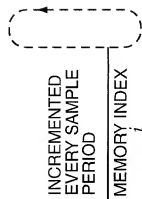


FIG. 10

EXAMPLE FILTER OUTPUTS FOR FOURTH-ORDER COMBINED FILTER

TIME INDEX n	INPUT $x(n)$	FILTER STATE 1 $x(n-1)$	FILTER STATE 2 $x(n-2)$	FILTER STATE 3 $x(n-3)$	FILTER STATE 4 $x(n-4)$	MEMORY INDEX i	OUTPUT $y(n)$
0	A	0	0	0	0	0	$A \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + 0 \cdot c_3(0) + 0 \cdot c_4(0)$
1	B	A	0	0	0	1	$B \cdot c_0(1) + A \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + 0 \cdot c_4(1)$
2	C	B	A	0	0	2	$C \cdot c_0(2) + B \cdot c_1(2) + A \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$
3	D	C	B	A	0	3	$D \cdot c_0(3) + C \cdot c_1(3) + B \cdot c_2(3) + A \cdot c_3(3) + 0 \cdot c_4(3)$
4	E	D	C	B	A	4	$E \cdot c_0(4) + D \cdot c_1(4) + C \cdot c_2(4) + B \cdot c_3(4) + A \cdot c_4(4)$
5	F	E	D	C	B	5	$F \cdot c_0(5) + E \cdot c_1(5) + D \cdot c_2(5) + C \cdot c_3(5) + B \cdot c_4(5)$
6	G	F	E	D	C	0	$G \cdot c_0(0) + F \cdot c_1(0) + E \cdot c_2(0) + D \cdot c_3(0) + C \cdot c_4(0)$
7	H	G	F	E	D	1	$H \cdot c_0(1) + G \cdot c_1(1) + F \cdot c_2(1) + E \cdot c_3(1) + D \cdot c_4(1)$

FIG. 11

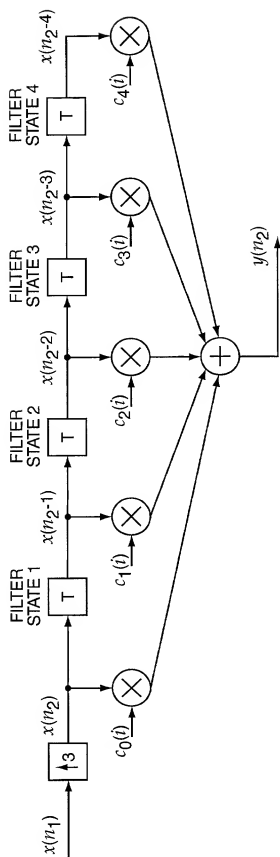


FIG. 12

EXAMPLE FILTER OUTPUTS FOR FOURTH-ORDER INTERPOLATION FILTER

TIME n_2	INPUT $x(n_1)$	INPUT $x(n_2)$	FILTER STATE 1 $x(n_2-1)$	FILTER STATE 2 $x(n_2-2)$	FILTER STATE 3 $x(n_2-3)$	FILTER STATE 4 $x(n_2-4)$	MEMORY INDEX i	OUTPUT $y(n_2)$
0	A	A	0	0	0	0	0	$A \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + 0 \cdot c_3(0) + 0 \cdot c_4(0)$
1	—	0	A	0	0	0	1	$0 \cdot c_0(1) + A \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + 0 \cdot c_4(1)$
2	—	0	0	A	0	0	2	$0 \cdot c_0(2) + 0 \cdot c_1(2) + A \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$
3	B	B	0	0	A	0	3	$B \cdot c_0(3) + 0 \cdot c_1(3) + 0 \cdot c_2(3) + A \cdot c_3(3) + 0 \cdot c_4(3)$
4	—	0	B	0	0	A	4	$0 \cdot c_0(4) + B \cdot c_1(4) + 0 \cdot c_2(4) + 0 \cdot c_3(4) + A \cdot c_4(4)$
5	—	0	0	B	0	0	5	$0 \cdot c_0(5) + 0 \cdot c_1(5) + B \cdot c_2(5) + 0 \cdot c_3(5) + 0 \cdot c_4(5)$
6	C	C	0	0	B	0	0	$C \cdot c_0(0) + 0 \cdot c_1(0) + 0 \cdot c_2(0) + B \cdot c_3(0) + 0 \cdot c_4(0)$
7	—	0	C	0	0	B	1	$0 \cdot c_0(1) + C \cdot c_1(1) + 0 \cdot c_2(1) + 0 \cdot c_3(1) + B \cdot c_4(1)$
8	—	0	0	C	0	0	2	$0 \cdot c_0(2) + 0 \cdot c_1(2) + C \cdot c_2(2) + 0 \cdot c_3(2) + 0 \cdot c_4(2)$

FIG. 13



EXAMPLE FILTER OUTPUTS
FOR FOURTH-ORDER POLYPHASE INTERPOLATION FILTER

TIME n_2	INPUT $x(n_1)$	FILTER STATE 1 $x(n_1-1)$	SELECTED PHASE	MEMORY INDEX i	OUTPUT $y(n_2)$
0	A	0	0	0	$A \cdot c_0(0) + 0 \cdot c_3(0)$
1	—	0	1	1	$A \cdot c_1(1) + 0 \cdot c_4(1)$
2	—	0	2	2	$A \cdot c_2(2)$
3	B	A	0	3	$B \cdot c_0(3) + A \cdot c_3(3)$
4	—	A	1	4	$B \cdot c_1(4) + A \cdot c_4(4)$
5	—	A	2	5	$B \cdot c_2(5)$
6	C	B	0	0	$C \cdot c_0(0) + B \cdot c_3(0)$
7	—	B	1	1	$C \cdot c_1(1) + B \cdot c_4(1)$
8	—	B	2	2	$C \cdot c_2(2)$

FIG. 15

